

Kramer Electronics, Ltd.



USER MANUAL

Model:

VS-120

20 x 1 Sequential Video Audio Switcher

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups¹ that are clearly defined by function.

Thank you for purchasing the Kramer TOOLS **VS-120** *20 x 1 Sequential Video Audio Switcher*, which is ideal:

- As a sophisticated alarm camera scanner
- For monitoring large duplication systems
- For automatic error detection in security systems

Each package includes the following items:

- The **VS-120** *20 x 1 Sequential Video Audio Switcher*
- Power cord²
- Windows[®]-based Kramer control software
- Null-modem adapter
- This user manual³

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high-performance high-resolution cables⁴

1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Twisted-Pair Solutions; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalars; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

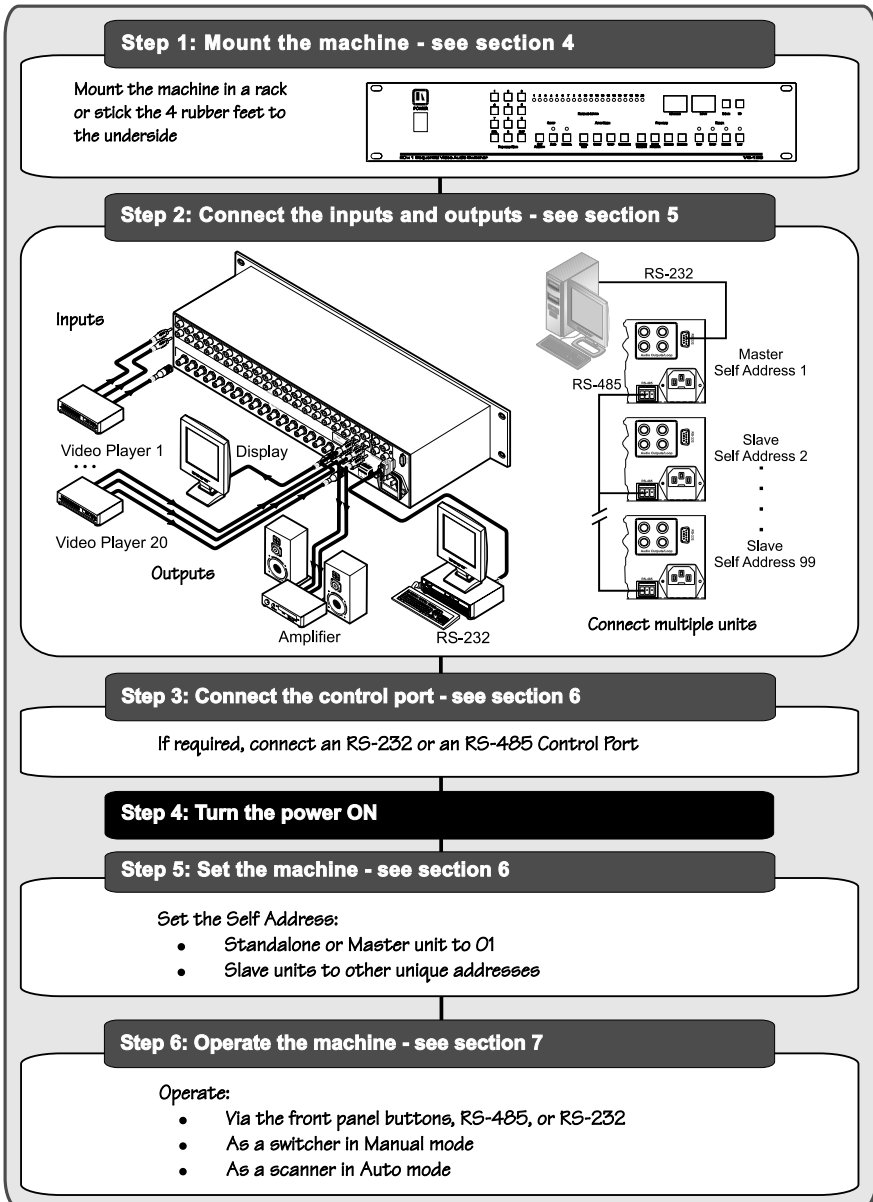
2 We recommend that you use only the power cord supplied with this device

3 Download up-to-date Kramer user manuals from our Web site at <http://www.kramerelectronics.com>

4 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.



3 Overview

The **VS-120 20 x 1 Sequential Video Audio Switcher** is a programmable scanning video switcher that accepts up to 20 inputs when operating as a standalone unit, sequentially cycling the 20 video and audio stereo sources. In manual mode it operates as a switcher and in automatic mode it operates as a scanner. The fully programmable EEPROM/NOVRAM memory saves and recalls all user-defined setups. Specifically, the **VS-120 20 x 1 Sequential Video Audio Switcher** features:

- Support for connecting up to 99 **VS-120** units to form a switcher/scanner with up to 1980 inputs
- Control via the front panel buttons or by RS-232 or RS-485 commands transmitted by a PC, touch screen system, or other serial controller
- Switching during the vertical interval, to ensure glitch-free transitions between genlocked sources
- Fully microprocessor controlled operation

To achieve the best performance:

- Use only good quality connection cables¹ to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer **VS-120** away from moisture, excessive sunlight and dust

¹ Available from Kramer Electronics on our Web site at <http://www.kramerelectronics.com>

Overview

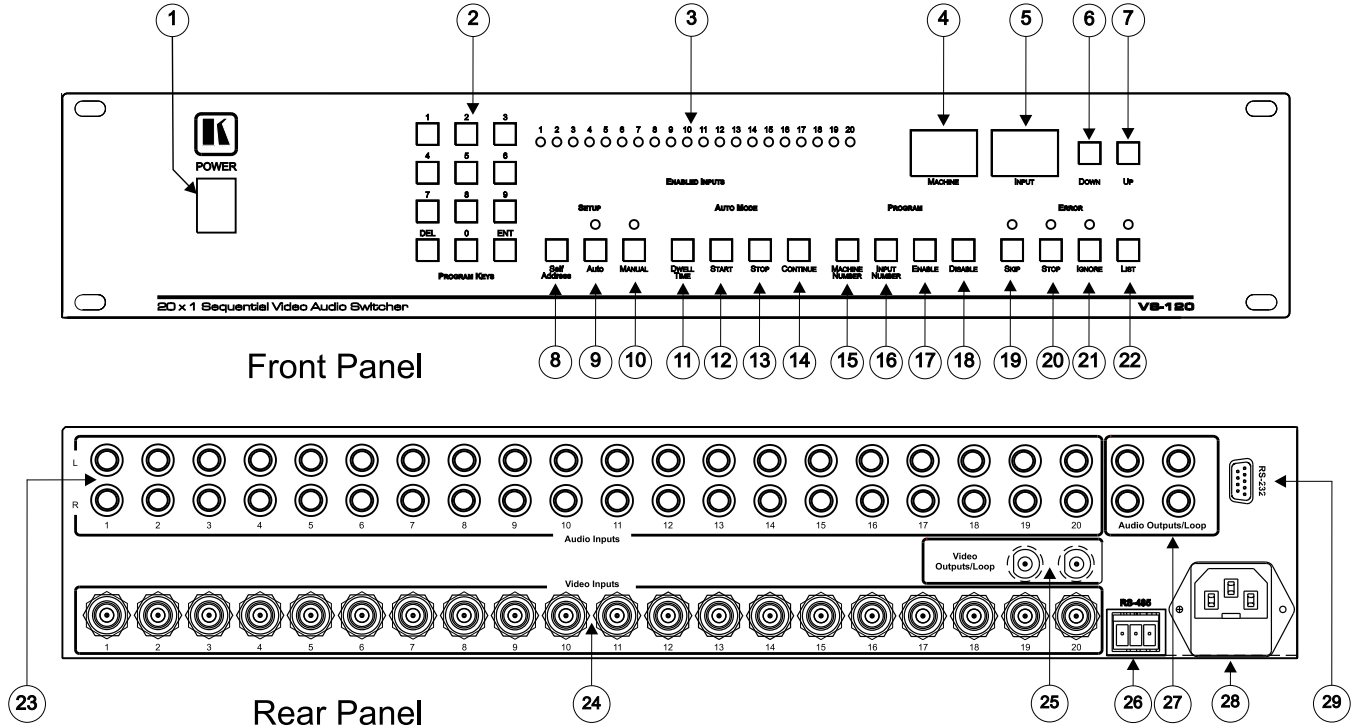


Figure 1: VS-120 20 x 1 Sequential Video Audio Switcher

Table 1: Front Panel Features and Functions of the VS-120

#	Feature		Function
1	POWER Switch		Illuminated switch for turning the unit ON or OFF
2	PROGRAM KEYS Buttons		Use to set the values for the <i>Machine Number</i> , <i>Input Number</i> or <i>Dwell Time</i>
3	ENABLED INPUTS LEDs		Indicate whether an input is enabled (on) or disabled (off)
4	MACHINE 7-segment Display		Displays the <i>Machine Number</i>
5	INPUT 7-segment Display		Displays the <i>Input Number</i>
6	DOWN Button		Press to decrease a number by one
7	UP Button		Press to increase a number by one
8	Setup	SELF ADDRESS Button	Sets the Machine # (between 1 and 99). Set a standalone machine address to 01
9		AUTO Button	Press to activate the scanner mode. Prevents using the unit as a switcher and lights the <i>Auto</i> LED
10		MANUAL Button	Press to activate the (default) switcher mode. Prevents using the unit as a scanner and lights the <i>Manual</i> LED
11	Auto Mode	DWELL TIME Button	Sets the scan display time (range is between 2 and 99 seconds) and flashes the current setting in the <i>MACHINE</i> Display
12		START Button	Starts scanning (only if the AUTO LED lights) from the first input of the first machine that is in the Enable state. Dwell Time determines the scanning time
13		STOP Button	Stops the scanning
14		CONTINUE Button	Starts scanning from the present connected input to the output (functions only when the <i>AUTO</i> LED lights)
15	Program	MACHINE NUMBER Button	Use to display another machine in a multiple unit configuration
16		INPUT NUMBER Button	Press to alter the <i>Enable/Disable</i> status of an input. The current <i>Input Number</i> flashes in the <i>INPUT</i> Display
17		ENABLE Button	Press to light the selected <i>Enabled Inputs</i> LED
18		DISABLE Button	Press to turn off the selected <i>Enabled Inputs</i> LED
19	Error	SKIP Button	Skips an input after detecting a video input error during scanning (lights the <i>Skip</i> LED) and continues scanning the next input
20		STOP Button	Stops scanning after detecting a video input error (lights the <i>Stop</i> LED)
21		IGNORE Button	Scans independently of the video input signal's characteristics (lights the <i>Ignore</i> LED)
22		LIST Button	Press to produce a list (during the first scanning cycle) of the video inputs at which a video signal is absent

Table 2: Rear Panel Features and Functions of the VS-120

#	Feature	Function
23	AUDIO INPUTS RCA Connectors	Connects to the left and right audio sources (from 1 to 20)
24	Video Inputs BNC Connectors	Connects to the video sources (from 1 to 20)
25	Video Outputs/Loop BNC Connectors	Connects to the video acceptor(s) (from 1 to 2)
26	RS-485 Terminal Block Port	Detachable terminal block port. PINOUT from left: + - G
27	Audio Outputs/Loop RCA Connectors	Connects to the left and right audio connectors on the acceptor(s) / next unit (from 1 to 2)
28	Power Connector with Fuse	AC connector enabling power supply to the unit
29	RS-232 DB 9F Port	Connect to the PC or the Remote Controller via a null-modem connection

4 Installing the VS-120 in a Rack

This section describes how to install the **VS-120** in a rack.

Before Installing in a rack

Before installing in a rack, be sure that the environment is within the recommended range:	
Operating temperature range	5° to 45° C (41° to 113° F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20° to +70° C (-4° to +158° F)
Storage humidity range	5 to 95% RHL, non-condensing



CAUTION!!

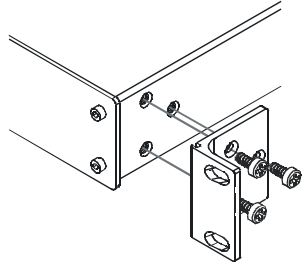
When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note that:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions (you can download it at: <http://www.kramerelectronics.com>)

5 Connecting the VS-120

To connect the **VS-120**, as shown in *Figure 2*, do the following¹:

1. Connect up to 20 video-audio stereo sources to the appropriate input video BNC connectors and input AUDIO L and AUDIO R RCA connectors (for example, video players 1 to 20).
2. Connect the output video BNC connectors (for example, to one or two displays) and output AUDIO L and AUDIO R RCA connectors to up to two audio stereo acceptors (for example, the amplifier).
3. If required, you can connect a PC and/or controller to the RS-232 or RS-485 ports (as shown below). To combine multiple units, connect them using the RS-485 ports.
4. Connect the power cord to the mains electricity (not shown in *Figure 2*).

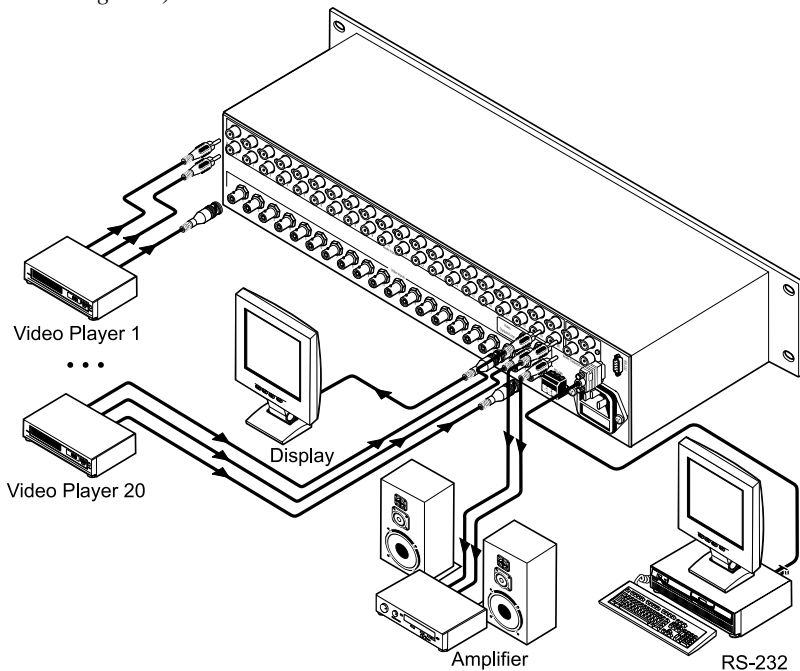


Figure 2: Connecting the VS-120

¹ Switch OFF the power on each device before connecting it to your **VS-120**. After connecting your **VS-120**, switch on its power and then switch on the power on each device

6 Controlling the VS-120

Operate the **VS-120** via the front panel buttons. You can also control the **VS-120** using the:

- RS-232 port (see section 6.1)
- RS-485 port (see section 6.2)

6.1 Controlling via the RS-232 Port

The **VS-120** can be operated via PC, touch screen, or serial controller by means of serial commands transmitted through the RS-232 port. For a description of the serial commands, see section 10.

6.1.1 Connecting the RS-232 Port

To connect a PC¹ to the **VS-120** unit, using the null-modem adapter provided with the machine (recommended):

- Connect the RS-232 9-pin D-sub rear panel port on the Master **VS-120** unit to the null-modem adapter and connect the null-modem adapter with a straight cable to the RS-232 9-pin D-sub port on your PC

To connect a PC to the **VS-120** unit, without using a null-modem adapter:

- Connect the RS-232 9-pin D-sub port on your PC to the RS-232 9-pin D-sub rear panel port on the Master **VS-120** unit, using a cable illustrated in *Figure 3*.

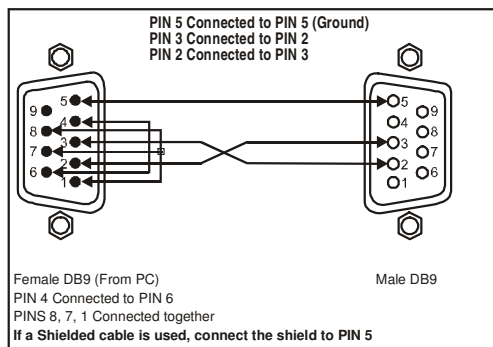


Figure 3: Connecting a PC without using a Null-modem Adapter

¹ Or a master program remote control system such as the Kramer RC-3000

6.1.2 Setting the Self Address

When controlling a unit through the RS-232 or RS-485 ports, each unit must be identified by a unique Self Address. The first unit connected to the PC is the master unit and its address must be 01. All other slave units must have unique addresses from 02 to 99.

To set the self address:

1. Press the SELF ADDRESS button in the SETUP section.
The MACHINE display flashes.
2. Enter a 2-digit address using the UP/DOWN buttons or the keypad.
3. Press ENT to save the address.

6.2 Controlling via the RS-485 Port

You can control up to 99 **VS-120** units via the RS-485 port using:

- A Master Programmable Remote Control system such as the Kramer **RC-3000** controller
- A PC that connects via its RS-232 interface to a master **VS-120** that connects up to 98 slave units through its RS-485 interface

If connecting a master **VS-120** to an RS-232 port in a PC, first follow the steps in section 6.1.

To connect an **RC-3000** to a **VS-120** unit, or slave units to a master **VS-120**:

1. Connect the left “A” (+) PIN on the RS-485 rear panel port of the master (or **RC-3000**) to the “A” (+) PIN on the RS-485 rear panel port of the **VS-120** slave unit.
2. Connect the center “B” (–) PIN on the RS-485 rear panel port of the master (or **RC-3000**) to the “B” (–) PIN on the RS-485 rear panel port of the **VS-120** slave unit.
3. If shielded twisted pair cable is used, the shield may be connected to the right “G” (Ground) PIN on one of the units (for example, on the master).

To connect up to 98 additional **VS-120** slave units, via RS-485, do the following (see *Figure 4*):

- Connect the RS-485 terminal block port on the first **VS-120** unit to the RS-485 port on the second **VS-120** unit and so on, connecting all the RS-485 ports
- Set the **Self Address** of the first machine to 01, the second machine to 02, and so on, up to 99 (see section 6.1.2).

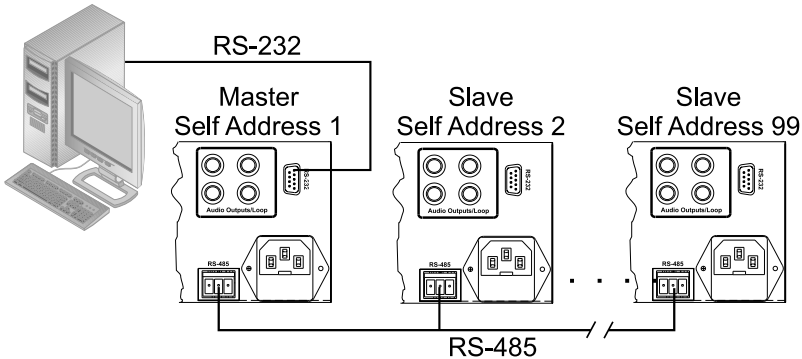


Figure 4: PC Controlling Multiple VS-120 Units

7 Operating the VS-120

This section describes how to operate the **VS-120**:

- As a switcher (see section 7.1)
- As a scanner (see section 7.2)
- To detect input errors (see section 7.2.3)
- In multiple unit configurations (see section 7.3)
- Using RS-232/RS-485 serial commands transmitted by a touch screen system, PC, or other serial controller (see section 7.4)

7.1 Operating the VS-120 as a Switcher

The **VS-120** operates as a 20 x 1 switcher when set to **Manual** mode. Any of the 20 inputs can be individually selected and routed to the output. When Manual mode is selected it prevents the scanning function from operating.

7.1.1 Choosing Manual Mode

To set the Manual mode:

- Press the MANUAL button in the SETUP section
The MANUAL LED illuminates

7.1.2 Routing an Input

To route an input to the output:

1. Choose an input by pressing the UP or DOWN buttons to increment or decrement the number in the INPUT display, then press ENT.
or,
Enter the input as a 2-digit number (01, 02, ... 20) on the PROGRAM KEYS pad, the MACHINE display flashes, then press ENT.

2. To optionally choose a different machine (if using a multiple unit configuration), enter the 2-digit input number on the PROGRAM KEYS pad. When the MACHINE display flashes, enter the target machine number, then press ENT.

If the MACHINE display already shows the number of the required machine, you can press ENT immediately without pressing the Machine #.

Example 1: If input #13 on machine #1 is connected to the output, and you want to connect input #5 to the output, press 0 followed by 5, and then ENT.

Example 2: If input #13 on machine #1 is connected to the output, and you want to connect input #7 of machine #2 to the output, press 0 followed by 7, and then 0 followed by 2, and then press ENT.

7.1.3 Enabling and Disabling Inputs

You can enable or disable individual inputs by programming. The setup is stored in non-volatile memory and is saved when the unit is powered off. When an input is enabled, its LED illuminates in the ENABLED INPUTS section.

To disable an input:

1. Press the INPUT NUMBER button in the PROGRAM section. The INPUT display and the AUTO and MANUAL LEDs flash.
2. Enter the desired input and press DISABLE to disable the input. The ENABLED INPUTS LED turns off.
3. Then press ENT. The AUTO and MANUAL LEDs stop flashing and the MANUAL LED is steadily on.

To enable an input:

1. Press the INPUT NUMBER button in the PROGRAM section. The INPUT display and the AUTO and MANUAL LEDs flash.
2. Enter the desired input and press ENABLE to disable the input. The input LED turns on.
3. Then press ENT. The AUTO and MANUAL LEDs stop flashing and the MANUAL LED is steadily on.

7.2 Operating the VS-120 as a Scanner

The **VS-120** operates as a 20 input scanner when set to **Auto** mode. The **VS-120** scans all enabled inputs, one after another, for the amount of time programmed in the Dwell Time setting and routes the input to the output. Any enabled input that does not have a video signal is logged in the Error List memory that can later be displayed.

When Auto mode is selected it prevents the switching function from operating.

7.2.1 Choosing Auto Mode

To set Auto mode:

- Press the **AUTO** button in the **SETUP** section
The **AUTO** LED illuminates

7.2.2 Scanning the Inputs

Dwell time determines how long each input is displayed during the scan. To set the dwell time:

1. Press the **DWELL TIME** button in the **AUTO MODE** section.
The **MACHINE** display flashes.
2. Set the dwell time in seconds from 2 to 99 by pressing the **UP/DOWN** keys or the **PROGRAM KEYS**.
3. Press **ENT** to save the number.

To begin an automatic scan:

- Press the **START** button in the **AUTO MODE** section
The **Input** display begins to increment automatically as it scans the inputs and the **AUTO** LED flashes

To stop the scan:

- Press the **STOP** button in the **AUTO MODE** section
The **Input** display stops on an input and the **AUTO** LED illuminates steadily

To continue the scan from the displayed input:

- Press the **CONTINUE** button in the **AUTO MODE** section.
The **Input** display increments from the displayed input and the **AUTO** LED flashes

To restart the scan from input 01:

- Press the **START** button in the **AUTO MODE** section.
The **Input** display begins to increment automatically as it scans the inputs and the **AUTO** LED flashes

7.2.3 Detecting Errors

While scanning, the **VS-120** senses missing video inputs, illuminates the LIST LED in the ERROR section, and stores the errored input number in memory. The list is erased and initialized every time a new scan is begun.

To stop an active scan when an error is detected:

- Press the STOP button in the Error section
The STOP LED illuminates when an error is detected and the scan is stopped

To skip an errored input:

- Press the SKIP button in the Error section
The SKIP LED illuminates when an error is detected and the scan continues

To ignore an input error:

- Press the IGNORE button in the Error section
The IGNORE LED illuminates and the scan continues regardless of errors

Note: To change the error Skip, Stop, and Ignore settings, scanning must be stopped by pressing the STOP button in the AUTO MODE section.

To display the list of errored inputs:

1. Press the STOP button in the AUTO MODE section to stop the scan.
2. Press the LIST button in the Error section.
The Machine and Input displays flash the numbers of the machine and first input that has an error.
3. Press the UP button to display the input errors one after another.
4. You can delete each error from the list by pressing the DEL button in the Program Keys section. When the list is empty, the LIST LED turns off, the display stops flashing, and the last scanned input shows in the display.

7.3 Operating Multiple VS-120 Units

Multiple unit configurations of the **VS-120** can be created to increase the number of outputs switched or scanned. Two **VS-120s** can be combined to create a 40 x 1 switcher/scanner, three units can combine into a 60 x 1 switcher/scanner, and so on, up to 99 **VS-120s**. The multiple unit configuration is seen as one large switcher/scanner.

The units must be connected via their RS-485 ports (see section 6.2). The first **VS-120** must have Self Address 01 and following machines must have

unique addresses (see *Figure 5*). The outputs from all the machines can be tied together to create one output for the multi-unit machine.

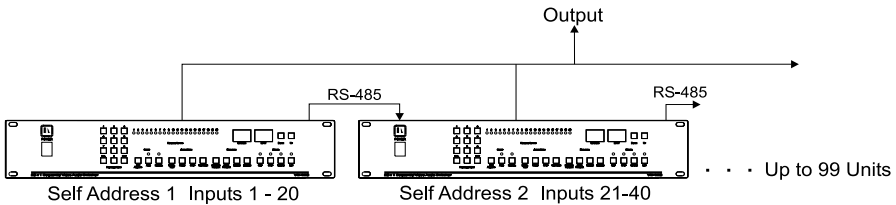


Figure 5: Multiple Unit Configuration

7.3.1 Viewing the Configuration of Another Machine

The configuration of any machine can be viewed from any other machine to see which inputs are enabled or disabled.

To view the configuration of another target machine:

1. In Manual mode, press the MACHINE NUMBER button in the PROGRAM section.
The MACHINE display and the AUTO and MANUAL LEDs flash.
2. Enter the address of the target machine using the UP or DOWN buttons or the PROGRAM KEYS, and press ENT.
The AUTO and MANUAL LEDs stop flashing. The MACHINE display also stops flashing and shows the address of the target machine.
The LEDs of the Enabled Inputs display the active inputs on the target machine.

7.3.2 Routing an Input from Another Machine

To route an input from a target machine (in Manual mode):

1. Using the PROGRAM KEYS (the UP and DOWN keys won't allow selection of a different machine), enter the desired output from 01 to 20 on the target machine.
The input display shows the target input and the MACHINE display flashes.
2. Enter the target machine address using the PROGRAM KEYS and press ENT.
The MACHINE display stops flashing and the target input is routed to the output.

7.4 Operating Using Serial Commands

To operate your device using serial commands, install Kramer's control software (K-Router) that can be downloaded from the Kramer Electronics Web site¹.

For an explanation of the RS-232 protocol and all serial commands, see section 10.

8 Technical Specifications

The **VS-120** technical specifications are shown in *Table 3*:

Table 3: VS-120 Technical Specifications

INPUTS:	20 video, 1Vpp /75Ω on BNC connectors; 20 audio stereo, 1Vpp/50kΩ on RCA connectors.
OUTPUTS:	1 video, 1Vpp/75Ω on 2 BNC connectors, connected in parallel; 1 audio stereo, 1Vpp/100Ω on 2x2 RCA connectors, connected in parallel; RS-232 on a 9-pin D-sub connector; RS-485 on a 3-pin terminal block connector.
DISPLAY:	4 seven-segment display LEDs, 20 LED status display.
CONTROL:	12-key keypad control, 17 touch switch setup controls, RS-232, RS-485.
SWITCHING:	Vertical interval.
DWELL TIME:	1–60s.
ERROR DETECTION:	Sync detection.
VIDEO BANDWIDTH:	25MHz (-3dB).
AUDIO BANDWIDTH:	20kHz (-1dB).
DIFF. GAIN:	1.3%.
K-FACTOR:	<0.05%.
DIMENSIONS:	19" x 7" x 2U W, D, H, rack mountable.
POWER SOURCE:	230V AC, 50/60Hz (115V AC, U.S.A), 6.7VA.
WEIGHT:	4.1kg (9.1lbs) approx.
ACCESSORIES:	Power cord, Windows [®] -based control software, null-modem adapter.

¹ www.kramerelectronics.com

9 Hex Table

Table 4 lists the Hex values for the **VS-120** (see section 10 for more detail):

Table 4: VS-120 Hex Table

Inputs	Switch Commands (Hex)	Inputs	Switch Commands (Hex)
IN 1	40 80 81	IN 11	40 80 8B
IN 2	40 80 82	IN 12	40 80 8C
IN 3	40 80 83	IN 13	40 80 8D
IN 4	40 80 84	IN 14	40 80 8E
IN 5	40 80 85	IN 15	40 80 8F
IN 6	40 80 86	IN 16	40 80 90
IN 7	40 80 87	IN 17	40 80 91
IN 8	40 80 88	IN 18	40 80 92
IN 9	40 80 89	IN 19	40 80 93
IN 10	40 80 8A	IN 20	40 80 94

10 RS-232 Communication Protocol for the VS-120

RS-232 communication with the **VS-120** is done using three bytes of information as defined below. The data rate is 9600 baud, no parity, 8 data bits, and one stop bit.

Byte 1:

COMMAND							
0	x	x	x	x	x	x	x
7	6	5	4	3	2	1	0

Byte 2:

ADDRESS							
1	x	x	x	x	x	x	x
7	6	5	4	3	2	1	0

Byte 3:

DATA							
1	x	x	x	x	x	x	x
7	6	5	4	3	2	1	0

DETAILED DESCRIPTION

Byte 1

Byte 1, bits 0 to 5 = COMMAND number = CODE (listed below)

Byte 1, bit 6 = Destination bit:

When the PC sends a message to the machine, this bit must be 1

When the machine sends a message to the PC, this bit must be 1.

If this bit is 0, this message is not destined for the PC.

Byte 1, bit 7 must be 0.

Byte 2

Byte 2, bits 0 to 6 = ADDRESS. These bits describe the Machine number that is influenced by COMMAND.

The number of machine can be from 1 to 99 (hex). 1 = Master.

Byte 2, bit 7 must be 1.

Byte 3

Byte 3, bits 0 to 6 = DATA. These bits describe the DATA that is influenced by COMMAND.

For example, to connect input 17 to output, the DATA should be 17(hex).

Byte 3, bit 7 must be 1.

Table 5: Instruction Codes for VS-120 Protocol

Note: All values in the table are hex, unless otherwise stated.

Code	Command	Address	Data	Replay
00	CONNECT INPUT TO OUTPUT	Machine number	Input number	Nonessential
01	GET STATUS - WHICH INPUT IS CONNECTED TO OUTPUT	0	0	COMMAND – As sent 01 ADDRESS – Machine connected DATA – Input number
02	SET ALL MACHINES TO AUTO OR MANUAL MODE	0	1 – Auto 0 – Manual	Nonessential
03	GET THE STATUS OF MACHINES AUTO OR MANUAL MODE	0	0	COMMAND – As sent 03 ADDRESS – As sent DATA – 1 for Auto mode – 0 for Manual mode
04	SET DWELL TIME OF SCANNING	0	2 – 99	Nonessential
05	GET DWELL TIME OF SCANNING	0	0	COMMAND & ADDRESS – As sent DATA – Dwell time 2–99
06	START SCANNING	0	0	Nonessential
08	STOP SCANNING	0	0	Nonessential
09	CONTINUE SCANNING	0	0	Nonessential
0A	ENABLE INPUT FOR SCANNING	Machine number	Input number	Nonessential
0B	DISABLE INPUT FOR SCANNING	Machine number	Input number	Nonessential
0C	GET THE STATUS OF INPUT ENABLE OR DISABLE SCANNING	Machine number	Input number	COMMAND – 0A for Enable – 0B for Disable ADDRESS & DATA – As sent
16	SAVE THE STATUS OF INPUT ENABLE OR DISABLE SCANNING	Machine number	0	Nonessential
0D	SET ERROR STATUS SKIP, STOP, OR IGNORE	0	0 – Skip 1 – Stop 2 – Ignore	Nonessential
0E	GET ERROR STATUS SKIP, STOP, OR IGNORE	0	0	COMMAND & ADDRESS – As sent DATA – 0 for Skip – 1 for Stop – 2 for Ignore
0F	GET THE NUMBER OF LIST OF ERROR	0	0	COMMAND & ADDRESS – As sent DATA – Number of errors
10	GET ERROR NUMBER X (0 – LAST ERROR)	0	Error number	COMMAND – As sent ADDRESS – Machine number DATA – Input number of error
12	DELETE ALL ERRORS	0	0	Nonessential

EXAMPLES FOR USING THE PROTOCOL:

- 1) To connect input 8 in machine 2 to the output, set the bytes as below:

Byte 1 – 40(hex) + COMMAND = 40 + 00 = 40(hex).

Byte 2 – 80(hex) + ADDRESS(hex) = 80 + 02 = 82(hex).

Byte 3 – 80(hex) + DATA(hex) = 80 + 08 = 88(hex).

- 2) To change the machines status to "Auto" mode, set the bytes as below:

Byte 1 – 40(hex) + COMMAND = 40 + 02 = 42(hex).

Byte 2 – 80(hex) + ADDRESS(hex) = 80 + 00 = 80(hex).

Byte 3 – 80(hex) + DATA(hex) = 80 + 01 = 81(hex).

- 3) To get the Dwell time of scanning, set the bytes as below:

Byte 1 – 40(hex) + COMMAND = 40 + 05 = 45(hex).

Byte 2 – 80(hex) + ADDRESS(hex) = 80 + 00 = 80(hex).

Byte 3 – 80(hex) + DATA(hex) = 80 + 00 = 80(hex).

Reply:

The reply to this command is identical to the three bytes which were sent.

For example:

Byte 1 – 45(hex).

Byte 2 – 80(hex).

Byte 3 – 94(hex).

Therefore the Dwell time = 94(hex) - 80(hex) = 14(hex) = 20(dec).

- 4) To start scanning set the byte as below:

Byte 1 – 40(hex) + COMMAND = 40 + 06 = 46(hex).

Byte 2 – 80(hex) + ADDRESS(hex) = 80 + 00 = 80(hex).

Byte 3 – 80(hex) + DATA(hex) = 80 + 00 = 80(hex).

Notes:

- 1) Use the COMMAND "Connect input to Output" only in "Manual" mode.
- 2) Use the COMMAND "Start scanning" or "Continue scanning" only in "Auto" mode.
- 3) The two LEDs of "Auto" and "Manual" go out when using the COMMAND "Enable input for scanning" or "Disable input for scanning" until using the COMMAND "Save the status of inputs, Enable or Disable scanning"
- 4) Use the COMMAND "Save the status of inputs, Enable or Disable scanning" after using the COMMANDs "Enable input for scanning" and "Disable input for scanning".

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
 - i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
 - ii) Product modification, or failure to follow instructions supplied with the product
 - iii) Repair or attempted repair by anyone not authorized by Kramer
 - iv) Any shipment of the product (claims must be presented to the carrier)
 - v) Removal or installation of the product
 - vi) Any other cause, which does not relate to a product defect
 - vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

- EN-50081: "Electromagnetic compatibility (EMC);
generic emission standard.
Part 1: Residential, commercial and light industry"
EN-50082: "Electromagnetic compatibility (EMC) generic immunity standard.
Part 1: Residential, commercial and light industry environment".
CFR-47: FCC Rules and Regulations:
Part 15: "Radio frequency devices
Subpart B Unintentional radiators"

CAUTION!

- ☒ Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- ☒ Use the supplied DC power supply to feed power to the machine.
- ☒ Please use recommended interconnection cables to connect the machine to other components.



**For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com where updates to this user manual may be found.
We welcome your questions, comments and feedback.**



Caution

Safety Warning:

Disconnect the unit from the power supply before opening/servicing.



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